Claims

1. Method for determining the signal-to-noise ratio (OSNR) of an optical signal (S) having an arbitrary first polarization state which is converted by means of a plurality of settings of a polarization controller into a second polarization state, defined changes in the second polarization state, for which power values of the optical signal (S) are determined after selection of a polarization component, being set on the Poincaré sphere by the polarization controller,
characterized in that
the determined power values of the optical signal are stored and the signal-to-noise ratio (OSNR) of the optical signal is determined from a calculated value of the stored power values.

2. Method according to Claim 1,
characterized in that
an interpolated deviation is determined from the stored power values.

3. Method according to Claim 1 or 2,
characterized in that
the signal power is determined from the stored power values or the square of the interpolated deviations.

4. Method according to one of the preceding Claims,
characterized in that
the plurality of settings of the polarization controller are selected on a minimum basis according to a defined relationship between precision determination of the signal-to-noise ratio (OSNR) and measurement time.

5. Method according to one of the preceding Claims,

characterized in that

a) power values (LS) of the optical signal are recorded for only n settings of a first phase shift in the polarization controller,

b) n values from the recorded power spectrum (LS) are interpolated, from which values a deviation is determined and stored in a table,

c) steps a) to b) are additionally repeated for m-1 further settings of a second phase shift in the polarization controller for setting the n × m different polarization states, from which m-1 further deviations are determined and stored as further values in the table,

d) the optical signal-to-noise ratio (OSNR) is derived from the values stored in the table.

6. Method according to one of the preceding Claims, characterized in that

- a phase shift between the components of the electrical field vector of the optical signal (S) for the setting of the first phase shift in the polarization controller and, in addition, a polarization rotation with adjustable angle (δ, θ) relative to a following polarizer for the setting of the second phase shift in the polarization controller take place in such a way that
- a first phase shift is set, for which a plurality n (n>1) of angles (θ1, θ2, ..., θn) are set for a first angle (δ1), from which angles a set of power values for generating a spectrum is recorded,
- a first sinusoidal interpolation curve of the recorded spectrum is drawn through whose deviation (A1) is stored in the table,
- the settings of the angles (θ1, θ2., ..., θn) are repeated for further angles (δ2, ..., δm) with m>2 for further phase shifts for recording further spectra, from which further deviations

- (A2, ..., Am) are stored in the table, the values of which are squared and interpolated with a second sinusoidal curve,
- the signal-to-noise ratio (OSNR) of the optical signal is determined for any setting of the polarization controller from the deviation of the second sinusoidal curve.

7. Method according to one of the preceding Claims, characterized in that the deviation is determined by means of different phase shifts of a phase retarder plate from differently selected angles ($\theta 1$, $\theta 2$, ..., θn).

8. Method according to one of the preceding Claims, characterized in that the optical signal (S) is transmitted in a channel of a WDM signal having a plurality of channels (K1, K2, ...) and that the channels whose signal-to-noise ratio (OSNR) is to be determined are successively selected by spectral filtering.

9. Method according to one of the preceding Claims 1 to 6, characterized in that the optical signal (S) is transmitted in a channel of a WDM signal having a plurality of channels (K1, K2, ...) and a power value is stored in each case for a given combination of settings of the two phase shifts in the polarization controller for a plurality of, or all channels, so as to produce a set of power values (S1, S2, ...).

10. Method according to Claim 9, characterized in that

the power values (S1, S2, ...) stored for the individual channels are subject to determination of the signal-to-noise ratio (OSNR) in accordance with one of Claims 1 to 6.

11. Method according to Claim 9 or 10,
characterized in that
to record the power values (S1, S2, ...) a resolution cell having a bandwidth equal to or smaller than the spectral width of a channel of the WDM signal is selected.

12. Method according to one of the preceding Claims,
characterized in that
the power values (S1, S2, ...) are recorded simultaneously.

13. Device for carrying out the method according to one of the preceding claims, wherein, after passing through a first adjustable phase retarder plate (E1) and additionally a second adjustable phase retarder plate (E2), the optical signal (S) is injected into a linear polarizer (POL) with following optical spectrum analyzer (OSA),
characterized in that
there is connected to the optical spectrum analyzer (OSA) a memory unit (SE) for tabulating the signal's power values measured by the optical spectrum analyzer (OSA) for different settings of the phase retarder plate (E1, E2),
there is connected to the optical spectrum analyzer (OSA) a determination unit (EE) for determining the signal-to-noise ratio (OSNR) by interpolation and deviation searching of the power values recorded at the optical spectrum analyzer (OSA).

14. Device according to Claim 13,

characterized in that
the first phase retarder plate (E1) is a $\lambda/4$ plate and the second phase retarder plate (E2) is a $\lambda/2$ plate.